



Remedy Optimization at Navy Restoration Sites

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Presentation Outline

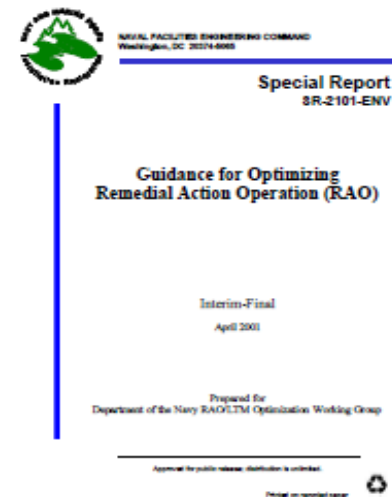
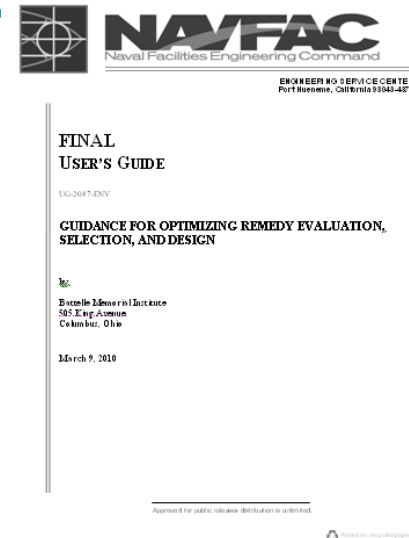


- Background
- Optimizing Remedy Selection
- Optimization Remedial Action Operation
- Implementing and Tracking Optimization Actions
- Summary

Navy Guidance Documents



- Developed by Navy Optimization Workgroup
- Guidance for Optimizing Remedy Evaluation, Selection, and Design – March 2010
 - Expands and updates 2004 version
- Guidance for Optimizing Remedial Action Operation (RAO), April 2001
 - Planned update 2011



Navy Guidance Documents

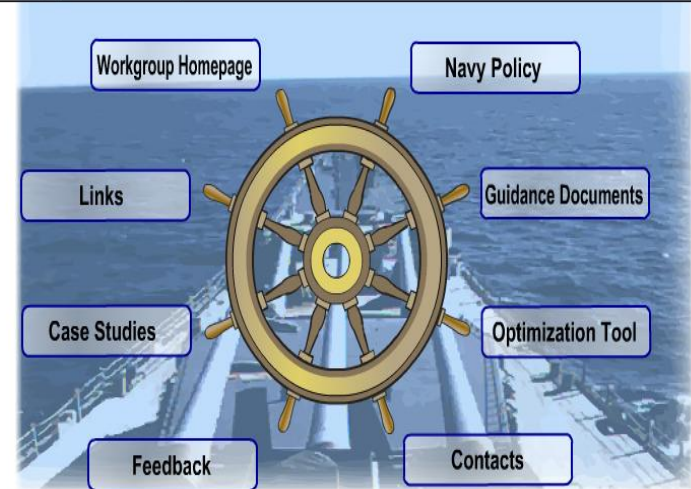


- Guidance documents available from Optimization Portal

www.ert2.org/T2Opt

Welcome to Technology Transfer Optimization Portal!

Welcome to NAVFAC's interactive case studies and training tool. The primary objective of optimization efforts is to maximize the effectiveness of remedial and removal actions while minimizing the cost to achieve site closeout. This Web page is a link to the optimization Web tool and also focuses on the case studies associated with the tool.



Navy Optimization Policy



- Policy issued April 2004
 - Optimization during all ER Program phases
 - Third party for conducting optimization evaluations
 - Requirements for New Pump & Treat systems
 - New NORM module to track optimization projects and progress
 - Use Navy optimization guidance documents

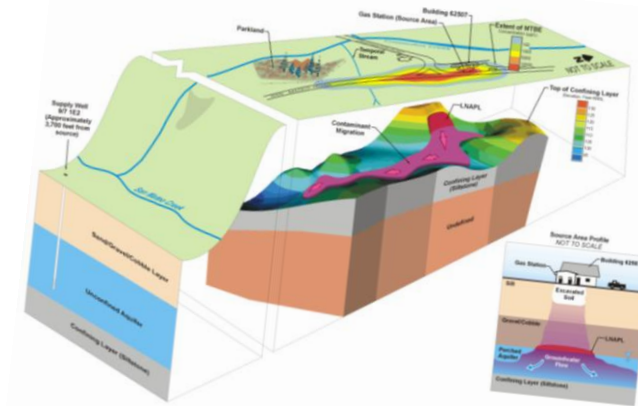
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Basic Concepts - Optimization Elements

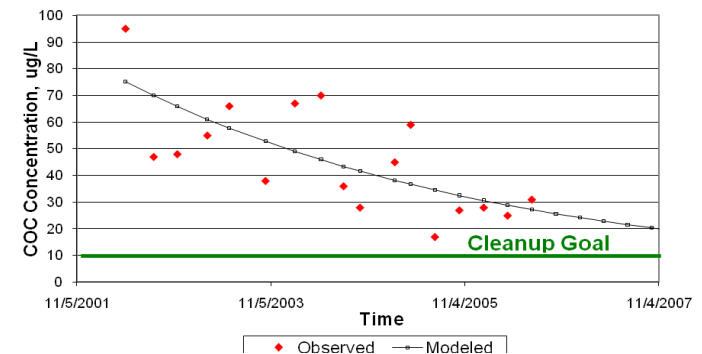


Conceptual Site Model

- An effective CSM provides information on:
 - Contaminant source and release
 - Contaminant distribution, transport, and fate
 - Geologic and hydrogeologic conditions
 - Risk assessment
- Need to update CSM as site conditions change
- Graphical representations are very helpful



Groundwater Monitoring Well Data for TCE



Basic Concepts - Optimization Elements



Remedial Action Objectives

- Provide a clear and concise description of what the remedial/removal action will accomplish. Examples:
 - Prevent, to the extent practicable, migration of VOCs in soil to groundwater
 - Minimize off-site migration of VOCs in groundwater to protect beneficial uses
- Do not specify technology or length of time

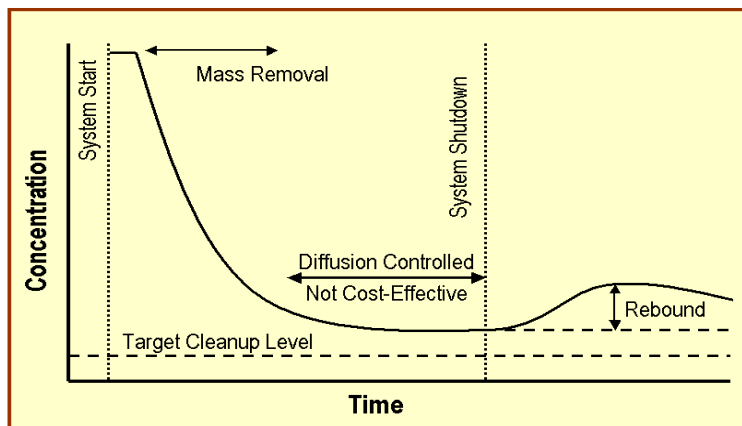
Target Treatment Zones

- Identify plume zones (e.g. source area, moderate COC levels in dissolved plume, very dilute plume) and then target these areas with specific technologies
 - Remedy for source area not suitable for dilute plume

Basic Concepts - Optimization Elements



Life Cycle Concentration During Remediation



Treatment Train

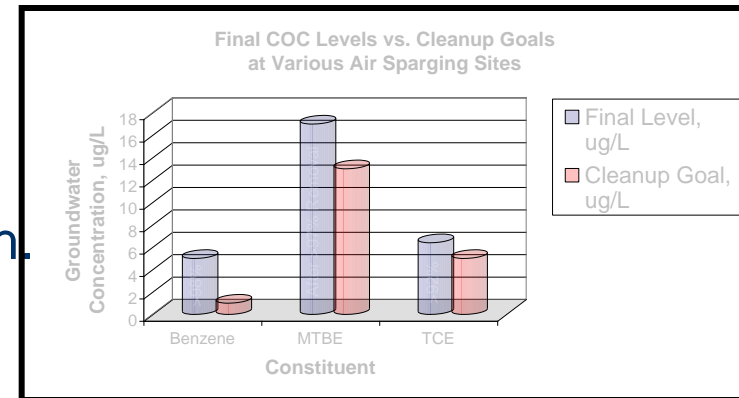
- Using multiple technologies for achieving cleanup goals cost effectively
 - Active remediation for a plume zone followed by less O&M intensive remedy such as MNA

Basic Concepts - Optimization Elements



Performance Objectives

- Need performance objectives based on operational efficiency and suitability of the selected remedy
 - Typical engineering performance & tech. limitations
- Examples
 - Reduction of overall contaminant concentrations
 - Mass removal to asymptotic levels (following optimization)



Optimization Considerations - Feasibility Study



- Identify and evaluate potential remediation alternatives & select the preferred alternative
- Technology selection based on life cycle and optimization concepts is a must for cost effective site closeout
- EPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA - EPA/ 540/ G- 89/ 004
 - Nine evaluation criteria
 - Not focused on life cycle concepts
- DON remedy selection optimization includes:
 - Optimizing Pre-FS - Remedial Alternatives Analysis
 - Optimization review draft FS - Third party review
 - Green and Sustainable Remediation Evaluation
- Optimization Workgroup is developing guidance for GSR
 - GSR Web portal

Optimization Considerations- Flexible ROD



- Flexible to change remedy based on:
 - Performance objectives
 - Optimization
- A single remedy is often not able to reduce COCs to MCLs
- Facilitate treatment train / technology substitution
- ROD flexibility could avoid cost and time consuming process for ROD modification
- Navy improved ROD projects
 - Reduced length of the document
 - Consolidated outline
 - Improved graphics & data tables
 - Detailed references to admin. record

Optimization Considerations- Remedial Design

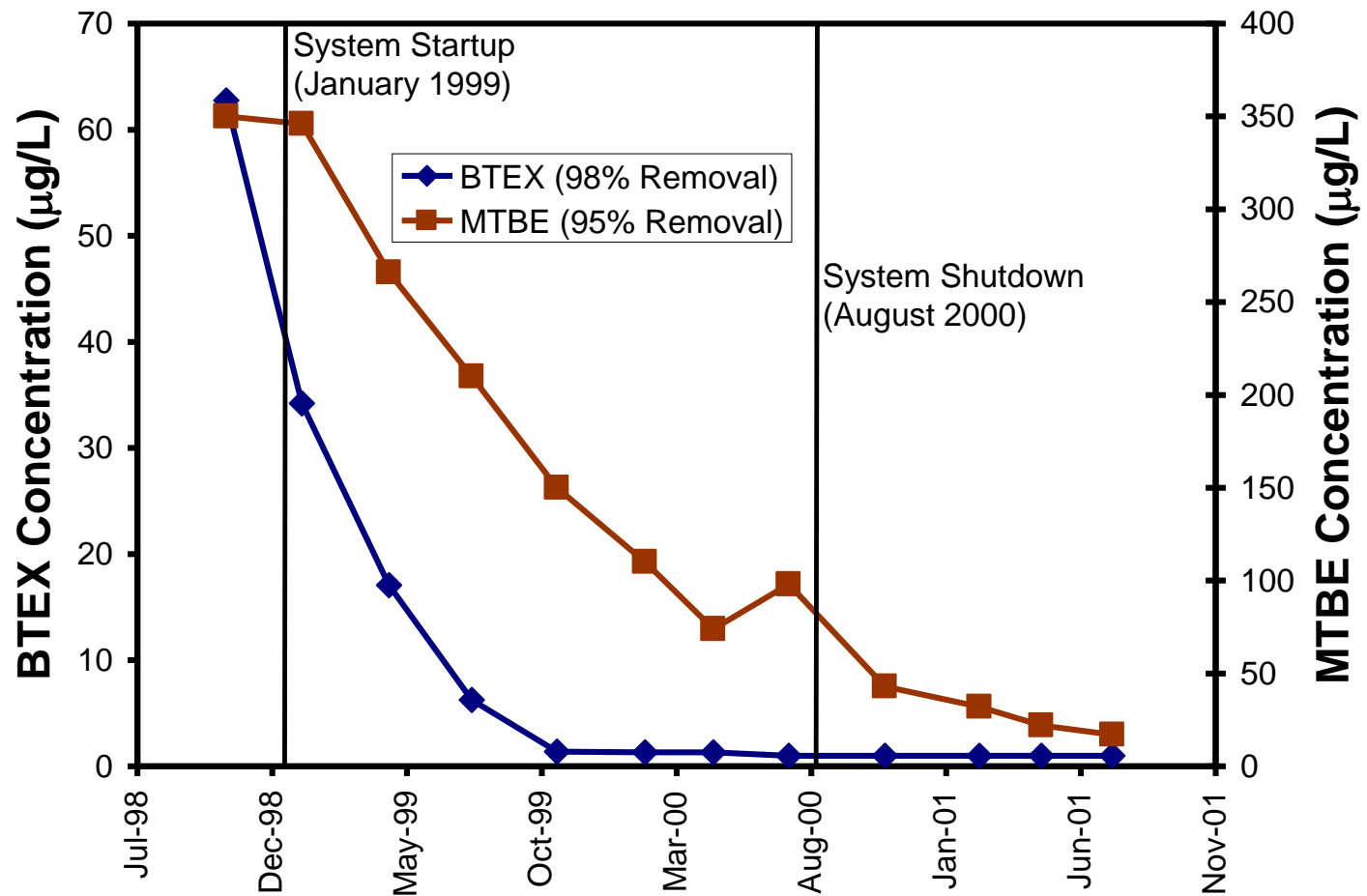


- Remedy design based on life-cycle concept
 - Declining contaminant concentration
 - Design for high initial concentration for the entire life of the project will be high in capital and O&M cost
- Based on updated CSM
- General Considerations
 - Passive delivery systems
 - Lease equipment?
 - Design for intermittent operation
 - Process control options
 - Standard design and parts
 - Ex situ treatment options
 - Sustainable remediation practices

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- Step 1: Review and Evaluate Remedial Action Objectives
- Step 2: Evaluate Remedial System Performance
 - Remediation effectiveness - contaminant removal
 - Is there a definite trend indicating progress toward cleanup objectives?
 - Will objectives be achieved as estimated?
 - Time series plots
 - Concentration vs. time
 - Cumulative mass removed versus time
 - New green & sustainable remediation metrics
 - » Greenhouse gas emission
 - » Energy consumption
 - » Other metrics

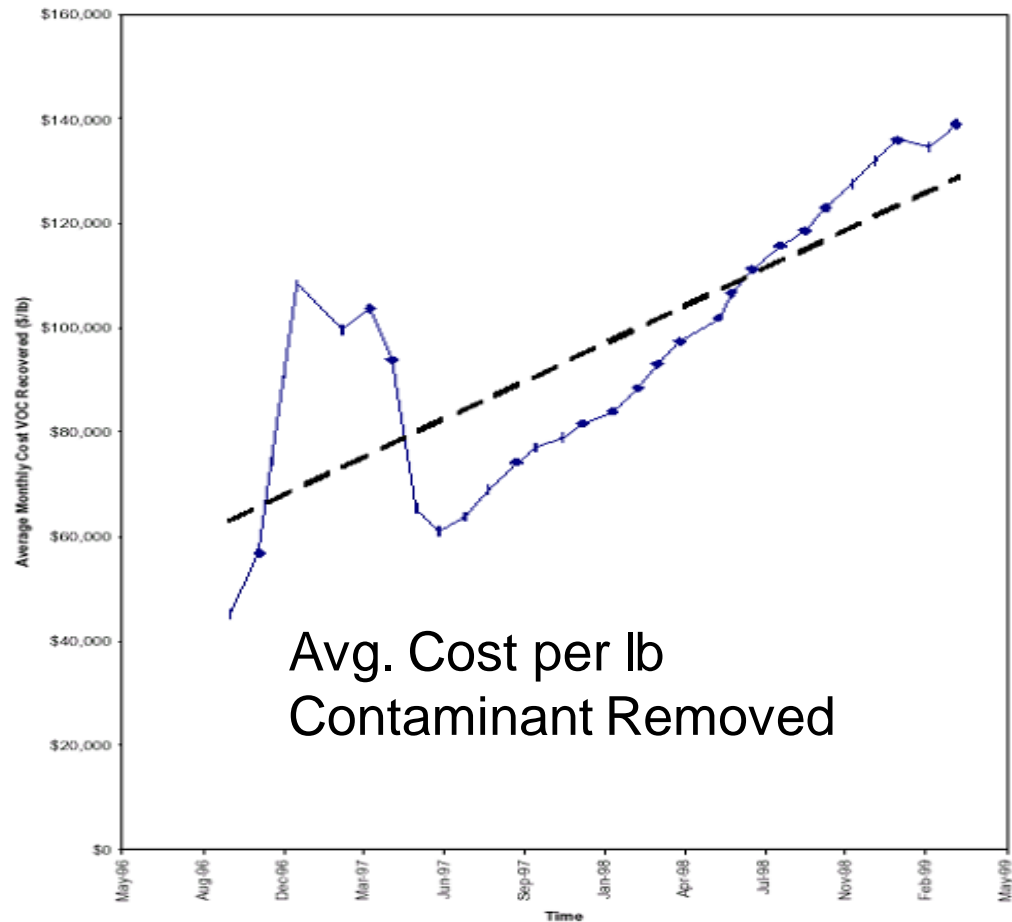
Contaminant Reduction



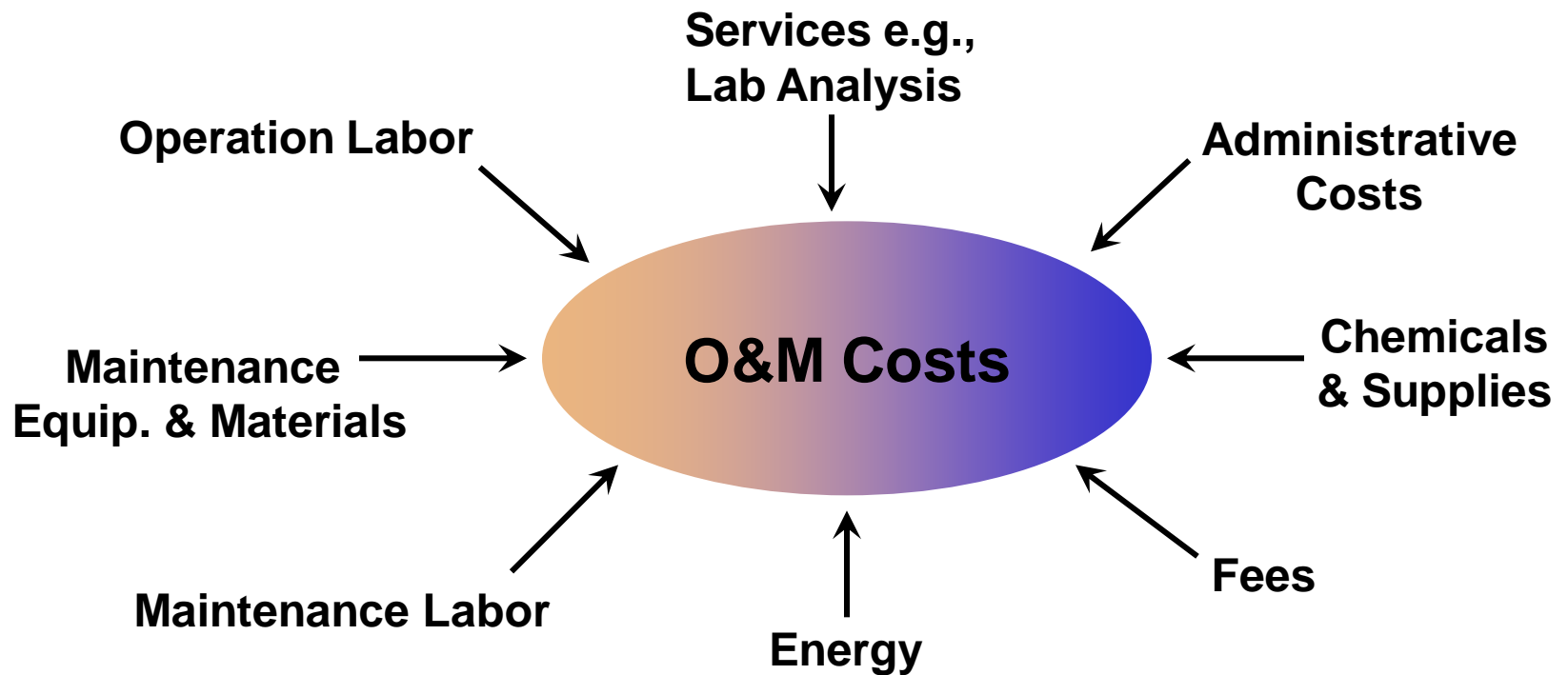
Step 3: Evaluate Cost Effectiveness of Existing System



- Is contaminant removal cost-effective?
 - Plot cumulative mass removed versus cumulative cost
 - Plot cost per unit mass removed versus time
- Are annual O&M costs decreasing?



Typical O&M Costs



Step 4. Identify System Modifications / Alternatives



- Modify Remedial System Operations
- Minimize O&M costs
- Modifications to the Existing Remedial Strategy
- Identify Alternative Remedial Strategy
- Other Considerations
 - Revising cleanup goals, LUCs, TI (not common)

Step 5. Develop & Prioritize Optimization Strategies



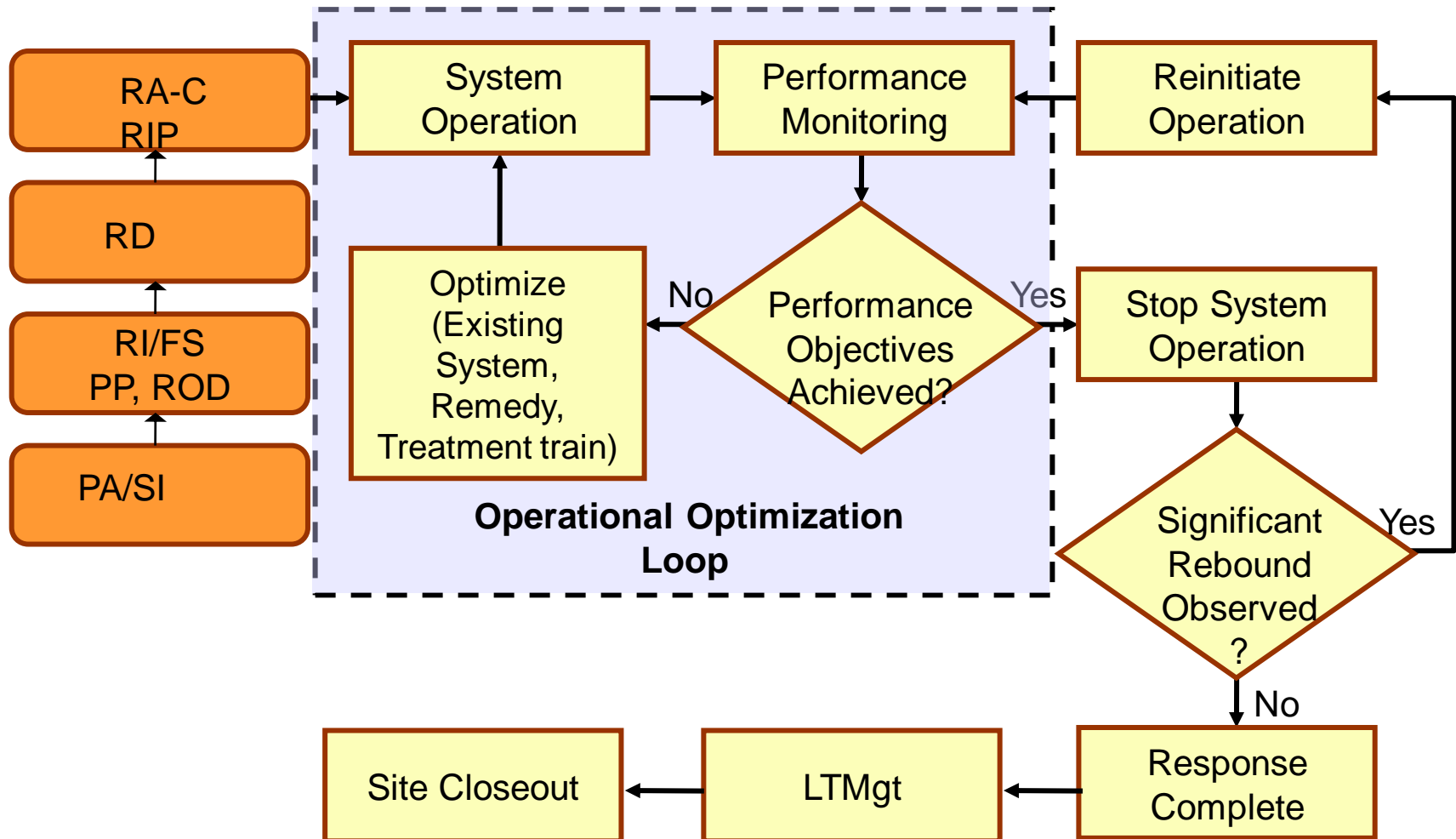
- Life cycle cost analysis - basis for prioritization
 - Include capital costs for modifications and O&M costs
 - Net Present Value approach and Total Cost
 - Low hanging fruit
- Develop Optimization Report

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Navy RPM Actions

- RPM and contractor implement optimization recommendations
- Regulatory buy-in
- For evaluating additional remedial options, may need a focused feasibility study
- May need to prepare Explanation of Significant Differences, or ROD modification (not very common)
- Continue to track remediation progress and costs

Optimization & Exit Strategy Example



Resources for Navy RPMs



- Regular classes through Naval Civil Engineers Officers School (CECOS)
- NAVFAC Remediation Innovative Technology Seminar offerings
- Annual Navy & Marine Corp Cleanup Conference
- Navy Optimization Workgroup members
- NAVFAC Website. Optimization portal – www.ert2.org

Optimization Tracking - NORM Optimization Module



Optimization View - Version 4.6.2.21

Round: Phase: Study/Review Conducted By:

Study End Date: End Date Description: Study Cost in Dollars:

Pot Cost Avoid: Pot Implementation Cost: Pot CTC Increase:

Act Cost Avoid: Act Implementation Cost: Act CTC Increase:

Study Description Details:

Recommendations of Study:

Actions Taken on Recommendations:

Points of Contact:

Name	Phone	Email
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Summary



- Navy requires optimization of all remedial action during all ER phases
- Guidance documents are available and training opportunities are routinely provided to Navy RPMs and contractors
- Improve remedy selection – must consider various concepts
- Flexible RODs
- Evaluate performance and optimize remedy performance
- Implement and track optimization actions

Questions